

**VAMC WACO, TEXAS****SECTION 07 60 00  
FLASHING AND SHEET METAL****PART 1 - GENERAL****1.1 DESCRIPTION**

Formed sheet metal work for flashing is specified in this section,  
including gutters, downspouts of copper.

**1.2 RELATED WORK**

- A. Sealant compound and installation: Section 07 92 00, JOINT SEALANTS.
- B. Flashing of Roof Drains: Section 22 11 00, FACILITY WATER DISTRIBUTION,  
Section 22 13 00, FACILITY SANITARY SEWERAGE, Section 22 14 00,  
FACILITY STORM DRAINAGE.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT  
DATA, AND SAMPLES.
- B. Shop Drawings:
  - Flashings
  - Gutter
- C. Manufacturer's Literature and Data:
  - Thru wall flashing
  - Nonreinforced, elastomeric sheeting
  - Bituminous coated copper

**1.4 APPLICABLE PUBLICATIONS**

- A. The publications listed below for a part of this specification to the  
extent referenced. The publications are referenced in the text by the  
basic designation only.
- B. American Society for Testing and Materials (ASTM):
  - A167-99(R 2009).....Stainless and Heat-Resisting Chromium-Nickel  
Steel Plate, Sheet, and Strip
  - A653/A653M-09a.....Steel Sheet Zinc-Coated (Galvanized) or Zinc  
Alloy Coated (Galvanized) by the Hot- Dip  
Process
  - B32-08.....Solder Metal
  - B370-09.....Copper Sheet and Strip for Building  
Construction

B749-03(2009)                      Lead and Lead Alloy Strip, Sheet, and Plate Products

C920-10.....Elastomeric Joint Sealants.

D173-03.....Bitumen-Saturated Cotton Fabric Used in Roofing  
& Waterproofing

D412-06.....Vulcanizing Rubber and Thermoplastic Elastomers  
Tension

D1187-97 (R2002).....Asphalt Base Emulsions for Use as Protective  
Coatings for Metal

D4586-07.....Asphalt Roof Cement, Asbestos Free

C. Sheet Metal and Air Conditioning Contractors National Association  
(SMACNA): Architectural Sheet Metal Manual (2003 Edition).

D. National Association of Architectural Metal Manufacturers (NAAMM):  
AMP 500-505-88.....Metal Finishes Manual

E. Federal Specification (Fed. Spec):  
A-A-1925A.....Shield, Expansion; (Nail Anchors)  
UU-B-790A.....Building Paper, Vegetable Fiber

F. International Building Code (IBC):  
Latest Edition

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Solder: ASTM B32; flux type and alloy composition as required for use with metals to be soldered.
- B. Stainless Steel: ASTM A167, Type 302B, dead soft temper.
- C. Copper ASTM B370, cold-rolled temper, 16 ounce for flashings, 20 ounce for clips and cleats. Copper at all roof areas.
- D. Bituminous Coated Copper: Minimum copper ASTM B370, weight not less than 1 kg/m<sup>2</sup> (3 oz/sf). Bituminous coating shall weigh not less than 2 kg/m<sup>2</sup> (6 oz/sf); or, copper sheets may be bonded between two layers of coarsely woven bitumen-saturated cotton fabric ASTM D173. Exposed fabric surface shall be crimped.
- E. Sheet Lead: ASTM B749, minimum 4 lbs/sq.ft. (0.0625 inches thick).
- E. Galvanized Sheet: ASTM, A653.
- F. Nonreinforced, Elastomeric Sheet: Elastomeric substances reduced to thermoplastic state and extruded into continuous homogenous sheet (0.056 inch) thick. Sheet shall have not less than 7 MPa (1,000 psi)

tensile strength and not more than seven percent tension-set at 50 percent elongation when tested in accordance with ASTM D412. Sheetting shall show no cracking or flaking when bent through 180 degrees over a 1 mm (1/32 inch) diameter mandrel and then bent at same point over same size mandrel in opposite direction through 360 degrees at temperature of -30°C (-20 °F).

1. Locations: Perimeter of windows and exterior doors and elsewhere as indicated.

G. Rosin Paper: Fed-Spec. UU-B-790, Type I, Grade D, Style 1b, Rosin-sized sheathing paper, weighing approximately 3 Kg/10 m<sup>2</sup> ( 6 lbs/100 sf).

H. Bituminous Paint: ASTM D1187, Type I.

I. Fasteners:

1. Use copper, copper alloy, bronze, brass, or stainless steel slater's nails with minimum 3/8 inch head for copper, and copper clad stainless steel, and stainless steel for stainless steel. Use galvanized steel or stainless steel for galvanized steel.

2. Nails:

a. Minimum diameter for copper nails: 3 mm (0.109 inch).

b. Minimum diameter for aluminum nails: 3 mm (0.0105 inch).

c. Minimum diameter for stainless steel nails: 2 mm (0.095 inch) and annular threaded.

c. Length to provide not less than 22 mm (7/8 inch) penetration into anchorage.

3. Rivets: Not less than 3 mm (1/8 inch) diameter.

4. Expansion Shields: Fed Spec A-A-1925A.

J. Sealant:

1. Sealant: ASTM C 920, Type S, Grade NS, Class 25, single component, chemical curing, non-staining, non-bleeding, non-sagging, Sonolastic NP-1, by Sonneborne Building Products, or approved equal, in color(s) chosen by Owner.

2. Tape: Butyl tape, 100 percent solids, in width and thickness to match application.

3. High Temperature Sealant: Type II, Class A, ASTM C 920, Type S, Grade NS, Class 25, use NT, M, and A; Sonneborne Omniseal Silicone, or approved equal.

4. Roof Penetration Flashing Sealer: ASTM C 920, Type S, Grade P, class 25, use TM; Sonneborne SL-1, one-part self-leveling polyurethane sealant, or approved equal.

K. Roof Cement: ASTM D4586.

L. Downspout Boots: Cast iron or cast aluminum, Style B-25 by Barry Pattern and Foundry or approved substitute, finished in color selected by Owner, meeting the requirements below:

1. Cast Iron: Cast iron conforming to ASTM A 48-70 or AASHTO M-105-621 specifications or:
2. Cast Aluminum: From high grade 319 alloy aluminum.
3. Boot shall be minimum six (6) feet tall overall dimension.
4. Boots shall be sized to fit existing and new underground storm drain connections.
5. Boots shall include lower offsets to move downspout connection away from existing wall.
6. Boot lower connections shall snugly fit existing or new underground storm drain connections.

**M. Receivers: Cast Iron: Gray iron, ASTM A 48/A 48M.**

## **2.2 SHEET METAL THICKNESS**

A. Except as otherwise shown or specified use thickness or weight of sheet metal as follows:

B. Concealed Locations (Built into Construction):

1. Copper: 16 oz. minimum.
2. Stainless steel: 0.25 mm (0.010 inch) thick.
3. Galvanized steel: 0.5 mm (0.021 inch) thick.

C. Exposed Locations:

1. Copper: 20 oz., except 24 oz. for gutters and downspouts.
2. Stainless steel: 0.4 mm (0.015 inch).

D. Thickness of galvanized steel is specified with each item.

## **2.3 FABRICATION, GENERAL**

A. Jointing:

1. In general, copper, and stainless steel joints, except expansion and contraction joints, shall be locked and soldered.
2. Jointing of copper over 0.5 Kg (20 oz) weight or stainless steel over 0.45 mm (0.018 inch) thick shall be done by lapping, riveting and soldering.
3. Joints shall conform to following requirements:
  - a. Flat-lock joints shall finish not less than 19 mm (3/4 inch) wide.
  - b. Lap joints subject to stress shall finish not less than 25 mm (one inch) wide and shall be soldered and riveted.

- c. Unsoldered lap joints shall finish not less than 100 mm (4 inches) wide.
4. Flat and lap joints shall be made in direction of flow.
5. Edges of bituminous coated copper, shall be jointed by lapping not less than 100 mm (4 inches) in the direction of flow and cementing with asphalt roof cement or sealant as required by the manufacturer's printed instructions.
6. Soldering:
  - a. Pre tin both mating surfaces with solder for a width not less than 38 mm (1 1/2 inches) of uncoated copper, stainless steel, and copper clad stainless steel.
  - b. Wire brush to produce a bright surface before soldering lead coated copper.
  - c. Treat in accordance with metal producers recommendations other sheet metal required to be soldered.
  - d. Completely remove acid and flux after soldering is completed.
- B. Expansion and Contraction Joints:
  1. Fabricate in accordance with the Architectural Sheet Metal Manual recommendations for expansion and contraction of sheet metal work in continuous runs.
  2. Space joints as shown or as specified.
  3. Space expansion and contraction joints for copper, stainless steel, and copper clad stainless steel at intervals not exceeding 7200 mm (24 feet).
  4. Space expansion and contraction joints for aluminum at intervals not exceeding 5400 mm (18 feet), except do not exceed 3000 mm (10 feet) for gravel stops and fascia-cant systems.
  5. Fabricate slip-type or loose locked joints and fill with sealant unless otherwise specified.
  6. Fabricate joint covers of same thickness material as sheet metal served.

## **2.4 FINISH**

- A. Use same finish on adjacent metal or components and exposed metal surfaces unless specified or shown otherwise.
- B. In accordance with NAAMM Metal Finishes Manual, unless otherwise specified.
- C. Finish exposed metal surfaces as follows, unless specified otherwise:
  1. Copper: Mill finish.

2. Stainless Steel: Finish No. 2B or 2D.

## **2.5 THROUGH-WALL FLASHINGS**

- A. Form through-wall flashing to provide a mechanical bond or key against lateral movement in all directions. Install a sheet having 2 mm (1/16 inch) deep transverse channels spaced four to every 25 mm (one inch), or ribbed diagonal pattern, or having other deformation unless specified otherwise.
  - 1. Fabricate in not less than 2400 mm (8 feet) lengths; 3000 mm (10 feet) maximum lengths.
  - 2. Fabricate so keying nests at overlaps.
- B. For Masonry Work When Concealed Except for Drip:
  - 1. Either copper, or stainless steel.
  - 2. Form an integral dam at least 5 mm (3/16 inch) high at back edge.
  - 3. Form exposed portions of flashing with drip, approximately 6 mm (1/4 inch) projection beyond wall face.
- C. For Masonry Work When Exposed Edge Forms a Receiver for Counter Flashing:
  - 1. Use same metal and thickness as counter flashing.
  - 2. Form an integral dam at least 5 mm (3/16 inch) high at back edge.
  - 3. Form exposed portion as snap lock receiver for counter flashing upper edge.
- D. For Flashing at Stone Panels.
  - 1. Use plan flat sheet of stainless steel.
  - 2. Form exposed portions with drip as specified or receiver.
- E. Window Sill Flashing and Lintel Flashing:
  - 1. Use nonreinforced elastomeric sheeting, bituminous coated copper.
  - 2. Fabricate flashing at ends with folded corners to turn up 5 mm (3/16 inch) in first vertical masonry joint beyond masonry opening.
  - 3. Turn up back edge as shown.
  - 4. Form exposed portion with drip as specified or receiver.
- F. Door Sill Flashing:
  - 1. Where concealed, use either 0.5 Kg (20 oz) copper, 0.5 mm (0.018 inch) thick stainless steel.
  - 2. Where shown on drawings as combined counter flashing under threshold, sill plate, door sill, or where subject to foot traffic, use either 0.6 Kg (24 ounce) copper, 0.6 mm (0.024 inch) stainless steel, or 0.6 mm (0.024 inch) thick stainless steel.

3. Fabricate flashing at ends to turn up 5 mm (3/16 inch) in first vertical masonry joint beyond masonry opening with folded corners.

## **2.6 BASE FLASHING**

- A. Pipe Flashing: (Other than engine exhaust or flue stack)
  1. Fabricate roof flange not less than 100 mm (4 inches) beyond sleeve on all sides.
  2. Extend sleeve up and around pipe and flange out at bottom not less than 13 mm (1/2 inch) and solder to flange and sleeve seam to make watertight.
  3. At low pipes 200 mm (8 inch) to 450 mm (18 inch) above roof:
    - a. Form top of sleeve to turn down into the pipe at least 25 mm (one inch).
    - b. Allow for loose fit around and into the pipe.
  4. At high pipes and pipes with goosenecks or other obstructions which would prevent turning the flashing down into the pipe:
    - a. Extend sleeve up not less than 300 mm (12 inch) above roofing.
    - b. Allow for loose fit around pipe.

## **2.7 HANGING GUTTERS**

- A. Fabricate gutters of not less than 0.6 Kg (24 oz) copper and to match existing gutters.
- B. Fabricate hanging gutters in sections not less than 2400 mm (8 feet) long, except at ends of runs where shorter lengths are required.
- C. Building side of gutter shall be same height as exterior side, unless otherwise indicated.
- D. Gutter Bead: Stiffen outer edge of gutter by folding edge over approximately 19 mm (3/4 inch) toward roof and down approximately 19 mm (3/4 inch) unless shown otherwise.
- E. Gutter Spacers:
  1. Fabricate of same material and thickness as gutter.
  2. Fabricate 25 mm (one inch) wide strap and fasten to gutters not over 900 mm (36 inches) on center.
  3. Turn back edge up 25 mm (one inch) and lap front edge over gutter bead.
  4. Rivet and solder to gutter except rivet and seal to aluminum.
- F. Outlet Tubes:

1. Form outlet tubes to connect gutters to conductors of same metal and thickness as gutters extend into the conductor 75 mm (3 inch).  
Flange upper end of outlet tube 13 mm (1/2 inch).

2. Lock and solder longitudinal seam.
3. Solder tube to gutter .
4. Fabricate basket strainers of same material as gutters.

G. Gutter Brackets:

1. Fabricate of same metal as gutter. Use minimum 1/4 by one inch) copper.
2. Fabricate to gutter profile.
3. Drill two 5 mm (3/16 inch) diameter holes in anchor leg for countersunk flat head screws.

## **2.8 REGLETS**

- A. Fabricate reglets of one of the following materials:
1. Stainless steel, not less than 0.3 mm (0.012 inch) thick.
- B. Fill open-type reglets with fiberboard or other suitable separator, to prevent crushing of the slot during installation.
- C. Bend edges of reglets for setting into concrete to an angle of not less than 45 degrees, and make wide enough to provide firm anchorage in the concrete.
- D. Fabricate reglets for building into horizontal masonry mortar joints not less than 19 mm (3/4 inch) deep, nor more than 25 mm (one inch) deep.
- E. Fabricate mitered corners, fittings, and special shapes as may be required by details.
- F. Reglets for concrete may be formed to receive flashing and have a 10 mm (3/8 inch), 45 degree snap lock.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. General:
1. Install flashing and sheet metal items as shown in Sheet Metal and Air Conditioning Contractors National Association, Inc., publication, ARCHITECTURAL SHEET METAL MANUAL, except as otherwise shown or specified.
  2. Apply Sealant as specified in Section 07 92 00, JOINT SEALANTS.
  3. Apply sheet metal and other flashing material to surfaces which are smooth, sound, clean, dry and free from defects that might affect the application.



4. Remove projections which would puncture the materials and fill holes and depressions with material compatible with the substrate. Cover holes or cracks in wood wider than 6 mm (1/4 inch) with sheet metal compatible with the roofing and flashing material used.
5. Coordinate with masonry work for the application of a skim coat of mortar to surfaces of unit masonry to receive flashing material before the application of flashing.
6. Apply a layer of 7 Kg (15 pound) saturated felt followed by a layer of rosin paper to wood surfaces to be covered with copper. Lap each ply 50 mm (2 inch) with the slope and nail with large headed copper nails.
7. Confine direct nailing of sheet metal to strips 300 mm (12 inch) or less wide. Nail flashing along one edge only. Space nail not over 100 mm (4 inches) on center unless specified otherwise.
8. Install bolts, rivets, and screws where indicated, specified, or required in accordance with the SMACNA Sheet Metal Manual. Space rivets at 75 mm (3 inch) on centers in two rows in a staggered position. Use neoprene washers under fastener heads when fastener head is exposed.
9. Coordinate with roofing work for the installation of metal base flashings and other metal items having roof flanges for anchorage and watertight installation.
10. Nail continuous cleats on 75 mm (3 inch) on centers in two rows in a staggered position.
11. Nail individual cleats with two nails and bend end tab over nail heads. Lock other end of cleat into hemmed edge.
12. Install flashings in conjunction with other trades so that flashings are inserted in other materials and joined together to provide a water tight installation.
13. Where required to prevent galvanic action between dissimilar metal isolate the contact areas of dissimilar metal with sheet lead, waterproof building paper, or a coat of bituminous paint.

### **3.2 THROUGH-WALL FLASHING**

#### **A. General:**

1. Install continuous through-wall flashing between top of concrete foundation walls and bottom of masonry building walls; at top of concrete floors; under masonry, concrete, or stone copings and elsewhere as shown.

2. Where exposed portions are used as a counterflashings, lap base flashings at least 100 mm (4 inches) and use thickness of metal as specified for exposed locations.
3. Exposed edge of flashing may be formed as a receiver for two piece counter flashing as specified.
4. Terminate exterior edge beyond face of wall approximately 6 mm (1/4 inch) with drip edge where not part of counter flashing.
5. Turn back edge up 6 mm (1/4 inch) unless noted otherwise where flashing terminates in mortar joint or hollow masonry unit joint.
6. Terminate interior raised edge in masonry backup unit approximately 38 mm (1 1/2 inch) into unit unless shown otherwise.
7. Under copings terminate both edges beyond face of wall approximately 6 mm (1/4 inch) with drip edge.
8. Lap end joints at least two corrugations, but not less than 100 mm (4 inches). Seal laps with sealant.
9. Where dowels, reinforcing bars and fastening devices penetrate flashing, seal penetration with sealing compound. Sealing compound is specified in Section 07 92 00, JOINT SEALANTS.
10. Coordinate with other work to set in a bed of mortar above and below flashing so that total thickness of the two layers of mortar and flashing are same as regular mortar joint.
11. Where ends of flashing terminate turn ends up 25 mm (1 inch) and fold corners to form dam extending to wall face in vertical mortar or veneer joint.
12. Turn flashing up not less than 200 mm (8 inch) between masonry or behind exterior veneer.
13. When flashing terminates in reglet extend flashing full depth into reglet and secure with lead or plastic wedges spaced 150 mm (6 inch) on center.
14. Continue flashing around columns:
  - a. Where flashing cannot be inserted in column reglet hold flashing vertical leg against column.
  - b. Counterflash top edge with 75 mm (3 inch) wide strip of saturated cotton unless shown otherwise. Secure cotton strip with roof cement to column. Lap base flashing with cotton strip 38 mm (1 1/2 inch).

- B. Flashing at Top of Concrete Foundation Walls Where concrete is exposed.  
Turn up not less than 200 mm (8 inch) high and into masonry backup mortar joint or reglet in concrete backup as specified.
- C. Flashing at Top of Concrete Floors (except where shelf angles occur):  
Place flashing in horizontal masonry joint not less than 200 mm (8 inch) below floor slab and extend into backup masonry joint at floor slab 38 mm (1 1/2 inch).
- D. Flashing at Cavity Wall Construction: Where flashing occurs in cavity walls turn vertical portion up against backup under waterproofing, if any, into mortar joint. Turn up over insulation, if any, and horizontally through insulation into mortar joint.
- E. Flashing at Veneer Walls:
1. Install near line of finish floors over shelf angles or where shown.
  2. Turn up against sheathing.
  3. At stud framing, hem top edge 19 mm (3/4 inch) and secure to each stud with stainless steel fasteners through sheathing.
  4. At concrete backing, extend flashing into reglet as specified.
  5. Coordinate with installation of waterproofing or asphalt felt for lap over top of flashing.
- F. Lintel Flashing when not part of shelf angle flashing:
1. Install flashing full length of lintel to nearest vertical joint in masonry over veneer.
  2. Turn ends up 25 mm (one inch) and fold corners to form dam and extend end to face of wall.
  3. Turn back edge up to top of lintel; terminate back edge as specified for back-up wall.
- G. Window Sill Flashing:
1. Install flashing to extend not less than 100 mm (4 inch) beyond ends of sill into vertical joint of masonry or veneer.
  2. Turn back edge up to terminate under window frame.
  3. Turn ends up 25 mm (one inch) and fold corners to form dam and extend to face of wall.
- H. Door Sill Flashing:
1. Install flashing under bottom of plate sills of doors over curbs opening onto roofs. Extend flashing out to form counter flashing or receiver for counter flashing over base flashing. Set in sealant.

2. Extend sill flashing 200 mm (8 inch) beyond jamb opening. Turn ends up one inch in vertical masonry joint, extend end to face of wall. Join to counter flashing for water tight joint.
3. Where doors thresholds cover over waterproof membranes install sill flashing over water proof membrane under thresholds. Extend beyond opening to cover exposed portion of waterproof membrane and not less than 150 mm (6 inch) beyond door jamb opening at ends. Turn up approximately 6 mm (1/4 inch) under threshold.

I. Flashing at Masonry, or Stone Copings:

1. Install flashing with drips on both wall faces unless shown otherwise.
2. Form penetration openings to fit tight against dowel or other item with edge turned up. Seal penetrations with sealant.

### 3.3 REGLETS

- A. Install reglets in a manner to provide a watertight installation.
- B. Locate reglets not less than 225 mm (9 inch) nor more than 400 mm (16 inch) above roofing, and not less than 125 mm (5 inch) nor more than 325 mm (13 inch) above cant strip.
- C. Butt and align end joints or each section of reglet and securely hold in position until concrete or mortar are hardened:
  1. Coordinate reglets for anchorage into concrete with formwork construction.
  2. Coordinate reglets for masonry to locate horizontally into mortar joints.

### 3.4 HANGING GUTTERS

- A. Hang gutters with high points equidistant from downspouts. Slope at not less than 1:200 (1/16 inch per foot).
- B. Lap joints, except for expansion joints, at least 25 mm (one inch) in the direction of flow. Rivet and seal or solder lapped joints.
- C. Support gutters in brackets spaced not more than 600 mm (24 inch) on centers, brackets attached to facial or wood nailer by at least two screws or nails.
  1. For copper gutters use brass or bronze brackets.
  2. Use brass or stainless steel screws.
- D. Secure brackets to gutters in such a manner as to allow free movement of gutter due to expansion and contraction.
- E. Gutter Expansion Joint:
  1. Locate expansion joints midway between outlet tubes.

2. Provide at least a 25 mm (one inch) expansion joint space between end baffles of gutters.
  3. Install a cover plate over the space at expansion joint.
  4. Fasten cover plates to gutter section on one side of expansion joint only.
  5. Secure loose end of cover plate to gutter section on other side of expansion joint by a loose-locked slip joint.
- F. Outlet Tubes: Set bracket strainers loosely into gutter outlet tubes.

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